CLAIMS

What is claimed is:

1. A method of producing variable rate filtered samples for use as data in a secondary process that has prescribed time intervals during which filtered samples are required, comprising:

producing multiple respective periodic sequences of filtered samples each having a same sample period, wherein each respective sequence can provide a different filtered sample during each sample period and the respective sequences are offset in time with respect to one another so that no filtered sample from any sequence overlaps with any filtered sample from any other sequence; and

selecting from among the respective sequences filtered samples that coincide with the timing requirements of the secondary process.

2. The method of claim 1, wherein selecting is done from at least one of the respective sequences.

3. The method of claim 1, wherein selecting is done from at least two of the respective sequences.

4. The method of claim 1, wherein selecting is done from at least three of the respective sequences.

5. The method of claim 1, wherein selecting is done from at least four of the respective sequences.

6. The method of claim 1, wherein selecting is performed sequentially and periodically from at least two of the respective sequences.

7. The method of claim 1, wherein:

each respective sequence has a same filter sampling time;

selecting is performed every prescribed time interval; and

the same filter sampling time is less than the prescribed time interval.

8. The method of claim 1, further comprising generating, from a sensor, sensor samples that are used to produce the filtered samples.

9. The method of claim 8, further comprising controlling a lithographic system using the filtered samples, wherein the sensor samples are indicative of a position of a stage assembly.

10. The method of claim 9, wherein the stage assembly positions at least one reticle.

11. The method of claim 9, wherein the stage assembly positions at least one wafer.

12. The method of claim 9, wherein producing generates an output sequence comprising a sample train of output samples as filtered samples.

13. The method of claim 1, wherein the sequences have a quantity equal to a value governed by the expression: value = maximum of $\{(T_f/T_{be})*n$, for all allowable $T_{be}\}$, where n is a smallest integer that will result in an integer value for $(T_f/T_{be})*n$, T_f is a filter sampling time and T_{be} is a prescribed time interval.

14. The method of claim 13, wherein selecting is performed every prescribed time interval, further comprising changing the prescribed time interval T_{be}.

15. The method of claim 1, wherein selecting is performed every prescribed time interval, further comprising changing the prescribed time interval T_{be}, wherein the prescribed time interval T_{be} comprises a blanking time T_b and an exposure time T_e and changing the prescribed time interval T_{be} comprises increasing the exposure time T_e.

16. The method of claim 1, wherein selecting is performed every prescribed time interval, further comprising:

changing the prescribed time interval T_{be}, wherein the prescribed time interval T_{be} comprises a blanking time T_b and an exposure time T_e and each respective sequence has a respective filter sampling time T_f; and

changing the respective filter sampling time T_f of each of the respective sequences.

17. The method of claim 16, wherein changing the respective filter sampling time T_f comprises decreasing the respective filter sampling time T_f.

18. The method of claim 16, wherein changing the prescribed time interval T_{be} comprises increasing the prescribed time interval T_b.

19. The method of claim 1, wherein the secondary process has multiple input sample windows during which it accepts samples, further comprising selecting from among the respective sequences filtered samples that result in respective coincidences of the selected filtered samples and the respective input sample windows for the secondary process.

20. A method of generating at a variable rate a filtered output using a synchronous filter, wherein the filtered output is accepted periodically by a secondary process with a secondary process period T_{be} and the synchronous filter generates the filtered output with a filter sampling time T_f, comprising:

changing the filter sampling time T_f of the synchronous filter such that the synchronous filter generates the filtered output when the secondary process is able to periodically accept the filtered output;

accepting a sensor sample by the synchronous filter;

generating the filtered output from the synchronous filter using the sensor sample; and

accepting the filtered output by the secondary process.

21. The method of claim 20, wherein the synchronous filter also generates the filtered output when the secondary process is unable to periodically accept the filtered output.

22. The method of claim 20, wherein the filtered output is for controlling a lithography source.

23. The method of claim 20, further comprising sampling a sensor to produce the sensor sample.

24. The method of claim 23, wherein the sensor sample is indicative of a position of a stage assembly.

25. The method of claim 24, wherein the stage assembly positions at least one reticle.

26. The method of claim 24, wherein the stage assembly positions at least one wafer.

27. The method of claim 22, wherein:

the lithography source generates a beam of charged particles;

the beam has a deflection; and

controlling the lithography source comprises adjusting the deflection of the beam.

28. The method of claim 20, further comprising increasing the secondary process period T_{be} such that the synchronous filter generates the filtered output when the secondary process is able to periodically accept the filtered output.

29. The method of claim 28, wherein the secondary process period T_{be} comprises a blanking time T_b and an exposure time T_e and increasing the secondary process period T_{be} comprises increasing the blanking time T_b.

30. The method of claim 20, further comprising increasing the secondary process period T_{be} wherein:

the secondary process period T_{be} comprises a blanking time T_b and an exposure time T_e;

increasing the secondary process period T_{be} comprises increasing the blanking time T_b; and

after increasing the blanking time T_b, the secondary process period T_{be} is substantially an integer multiple of the filter sampling time T_f.

31. A method of generating at a variable rate a filtered output using a synchronous filter, wherein the filtered output is accepted periodically by a secondary process with a secondary process period T_{be} and the synchronous filter generates the filtered output with a filter sampling time T_f, comprising:

increasing the secondary process period T_{be} by an amount such that the secondary process is able to periodically accept the filtered output at substantially the same time the synchronous filter produces the filtered output;

accepting a sensor sample by the synchronous filter;

generating the filtered output from the synchronous filter using the sensor sample; and

accepting the filtered output by the secondary process.

32. The method of claim 31, wherein the synchronous filter also generates the filtered output when the secondary process is unable to periodically accept the filtered output.

33. The method of claim 31, wherein the filtered output is for controlling a lithography source.

34. The method of claim 31, further comprising sampling a sensor to produce the sensor sample.

35. The method of claim 34, wherein the sensor sample is indicative of a position of a stage assembly.

36. The method of claim 35, wherein the stage assembly positions at least one reticle.

37. The method of claim 35, wherein the stage assembly positions at least one wafer.

38. The method of claim 33, wherein:

the lithography source generates a beam of charged particles;

the beam has a deflection; and

controlling the lithography source comprises adjusting the deflection of the beam.

39. The method of claim 31, further comprising increasing the secondary process period T_{be} such that the synchronous filter also generates the filtered output when the secondary process is able to periodically accept the filtered output, wherein:

the secondary process period T_{be} comprises a blanking time T_b and an exposure time T_e; and

increasing the secondary process period T_{be} comprises increasing the blanking time T_b.

40. The method of claim 31, further comprising increasing the secondary process period T_{be}, wherein:

the secondary process period T_{be} comprises a blanking time T_b and an exposure time T_e;

increasing the secondary process period T_{be} comprises increasing the blanking time T_b; and

after increasing the blanking time T_b, the secondary process period T_{be} is substantially an integer multiple of the filter sampling time T_f.

41. A system for use with a secondary process that requires different filtered samples during each of a sequence of input window time intervals, and for providing filtered electronic signal samples, comprising:

multiple filtered sample lines;

multiple filters, each periodically receiving a sample of a signal; wherein:

each filter periodically provides its filtered sample sequence to a filtered sample line with a respective filter sampling time T_f, and

the respective filtered sample sequences are offset in time with respect to one anther so that no filtered sample from any filtered sample sequence overlaps with any filtered sample from any other filtered sample sequence;

a multiplexer responsive to control signals and coupled to each of the multiple filtered sample lines; wherein:

the multiplexer accepts the respective periodic filtered output of each of the multiple filters, and

the multiplexer has a multiplexer output; and

control logic providing control signals causing the multiplexer to:

select from among the filtered sample lines in a sequence results in respective coincidences of respective filtered samples on respective selected filtered sample lines and respective input sample windows for the secondary process, and

sequentially provide respective filtered samples on respective selected lines as a sequence of filtered input for use by the secondary process.

42. The system of claim 41, wherein the sequence of filtered input is produced using less than all of the respective filtered sample sequences accepted by the multiplexer.

43. The system of claim 41, wherein the secondary process is controlled using the sequence of filtered input.

44. The system of claim 41, wherein the secondary process comprises a source for lithography that is controlled using the sequence of filtered input.

45. The system of claim 41, further comprising a sensor that generates the signal.

46. The system of claim 45, further comprising an analog-to-digital converter that periodically generates the sample of the signal.

47. The system of claim 46, wherein the sample is indicative of a position of a stage assembly.

48. The system of claim 47, wherein the stage assembly positions at least one reticle.

49. The system of claim 47, wherein the stage assembly positions at least one wafer.

50. The system of claim 44, wherein:

the lithography source generates a beam of charged particles;

the beam has a deflection; and

the deflection of the beam is controlled by the sequence of filtered input.

51. The system of claim 41, wherein:

the secondary process has a prescribed time interval T_{be} by which the input sample windows are spaced; and

the prescribed time interval T_{be} is less than the filter sampling time T_f.

52. The system of claim 41, wherein:

the multiple filters are programmable filters; and

the respective filter sampling time of each programmable filter can be changed.

53. The system of claim 41, wherein:

the secondary process has a prescribed time interval T_{be} by which the input sample windows are spaced;

the prescribed time interval T_{be} has multiple allowable values; and

the multiple filters have a quantity equal to a value governed by an expression: value = maximum of $\{(T_f/T_{be})*n$, for all allowable $T_{be}\}$, where n is a smallest integer that will result in an integer value for $(T_f/T_{be})*n$.

54. A lithography source control system comprising:

a sensor generating a signal;

multiple filters each periodically accepting a sample of the signal and producing a respective periodic filtered output with a filter sampling time T_f;

a multiplexer having a multiplexer output and accepting the respective periodic filtered output of each of the multiple filters;

control logic controlling the multiplexer such that the multiplexer output produces an output sequence of the respective periodic filtered output accepted by the multiplexer; and

a lithography source that is controlled using the output sequence.

55. The system of claim 54, wherein the output sequence is produced using less than all of the respective periodic filtered outputs accepted by the multiplexer.

56. The system of claim 54, further comprising an analog-to-digital converter generating the sample of the signal.

57. The system of claim 56, wherein the sample is indicative of a position of a stage assembly and the lithography source generates a beam of charged particles.

58. The system of claim 57, wherein the stage assembly positions at least one reticle.

59. The system of claim 57, wherein the stage assembly positions at least one wafer.

60. The system of claim 57, wherein the beam has deflection that is controlled by the output sequence.

61. The system of claim 54, wherein a prescribed time interval T_{be} is less than the filter sampling time T_f.

62. The system of claim 54, wherein:

the multiple synchronous filters have a quantity;

the sequence is a periodic sequence with a prescribed time interval T_{be} having multiple allowable values; and

the quantity is equal to a value governed by an expression: value = maximum of $\{(T_f/T_{be})*n$, for all allowable $T_{be}\}$, where n is a smallest integer that will result in an integer value for $(T_f/T_{be})*n$.

63. A method of exposing a wafer to an electron beam in a microlithography apparatus, comprising:

acquiring, from a sensor, data indicative of a position of a stage assembly that positions the wafer;

calculating, from the data, a velocity of the stage assembly and an acceleration of the stage assembly;

estimating, using the velocity and the acceleration, a future position of the stage assembly;

determining a difference between the position and the future position; and

adjusting at least one of:

the position within a predetermined position error, and

a deflection amount of the electron beam.

64. The method of claim 63, wherein acquiring comprises asynchronous data acquisition.